Department of Transportation
Federal Aviation Administration
Aircraft Certification Service
Washington, D.C.

TSO-C207a

Effective
Date: 8/18/17

Technical Standard Order

Subject: **Aeronautical Mobile Airport Communication System (AeroMACS) Airborne Mobile Station (AMS) Equipment**

1. PURPOSE. This technical standard order (TSO) is for manufacturers applying for a TSO authorization (TSOA) or letter of design approval (LODA). In it, we (the Federal Aviation Administration (FAA)) tell you what minimum performance standards (MPS) your Aeronautical Mobile Airport Communication System (AeroMACS) Airborne Mobile Station (AMS) equipment must first meet for approval and identification with the applicable TSO marking.

2. APPLICABILITY. This TSO affects new applications submitted after its effective date.

a. TSO-C207 will remain effective until February 18, 2019. After this date, we will no longer accept applications for TSO-C207.

b. AeroMACS equipment approved under previous versions of this TSOA may still be manufactured under the provisions of their original approval.

3. REQUIREMENTS. New models of AeroMACS AMS equipment identified and manufactured on or after the effective date of this TSO must meet the MPS qualification and documentation requirements applicable to AMS equipment in RTCA Document RTCA/DO-346, *Minimum Operational Performance Standard for Aeronautical Mobile Airport Communication System (AeroMACS),* dated February 20, 2014, Section 2.

a. Functionality. This TSO's standards apply to AeroMACS equipment intended to provide data link communication in the airport environment. AeroMACS equipment may provide access in the airport environment to one or more of the following services: Air Traffic Services (ATS), Aeronautical Operational Communication (AOC) including aeronautical information services and meteorological (AIS/MET) information, Airline Administrative Communication (AAC), and Airport Authority communication, as well as Aircraft Access to System Wide Information Management (SWIM) services. AeroMACS AMS equipment is intended for use while on the airport surface only. Passenger Information and Entertainment Service and passenger-owned devices are not included in this TSO.

AeroMACS is considered supplemental to communication equipment required by the operating rules. AeroMACS is based on the Institute of Electrical and Electronics Engineers 802.16-2009 standard, *Air Interface for Broadband Wireless Access Systems*, and is only intended for operation on the airport surface.

b. Failure Condition Classifications.

(1) Failure of the function defined in paragraph **3.a** is a *minor* failure condition. The minor failure condition classification is based on the network protocol and or application system layers above the AeroMACS AMS equipment to detect and annunciate errors that would result in misleading or missing ATS messages.

> **Note:** Installing, replacing or modifying TSO functions that provide potential for connectivity to unauthorized access may require security risk assessment based on the change impact analysis. Security measures added as a non-TSO function need to be evaluated during the aircraft installation approval process. A security risk assessment may be needed for this equipment. For more information, see Aircraft Certification Service (AIR) policy statement PS-AIR-21.16-02, Revision 2, *Establishment of Special Conditions for Cyber Security*.

(2) Loss of the function defined in paragraph **3.a** is a *minor* failure condition, provided that for equipment used for ATS communications, the loss of function is annunciated.

(3) Design the system to at least the above failure condition classifications.

c. Functional Qualification. Demonstrate the required functional performance under the test conditions specified in RTCA/DO-346 section 2.4. Applicants must propose a method to demonstrate interoperability with a FAA authorized AeroMACS data link.

d. Environmental Qualification. Demonstrate the required performance under the test conditions specified in RTCA/DO-346 section 2.3 using standard environmental conditions and test procedures appropriate for airborne equipment. You may use a different standard environmental condition and test procedure than RTCA/DO-160G, provided the standard is appropriate for the AeroMACS AMS equipment.

> **Note:** The use of RTCA/DO-160D (with Changes 1 and 2 only, without Change 3 incorporated) or earlier versions is generally not considered appropriate and will require substantiation via the deviation process as discussed in paragraph **3.f** of this TSO.

e. Software Qualification. If the article includes software, develop the software according to RTCA, Inc. document RTCA/DO-178C, *Software Considerations in Airborne Systems and Equipment Certification*, dated December 13, 2011, including referenced supplements as applicable, to at least the software level consistent with the failure condition classification defined in paragraph **3.b** of this TSO. You may also develop the software

according to RTCA, Inc. document RTCA/DO-178B, dated December 1, 1992 if you follow the guidance in AC 20-115C, *Airborne Software Assurance*, dated July 19, 2013.

f. Deviations. We have provisions for using alternate or equivalent means of compliance to the criteria in the MPS of this TSO. If you invoke these provisions, you must show that your equipment maintains an equivalent level of safety. Apply for a deviation under the provision of Title 14 of the Code of Federal Regulations (14 CFR) § 21.618.

4. MARKING.

a. Mark at least one major component permanently and legibly with all the information in 14 CFR § 45.15(b).

b. If the article includes software and/or airborne electronic hardware, then the article part numbering scheme must identify the software and airborne electronic hardware configuration. The part numbering scheme can use separate, unique part numbers for software, hardware, and airborne electronic hardware.

c. You may use electronic part marking to identify software or airborne electronic hardware components by embedding the identification within the hardware component itself (using software) rather than marking it on the equipment nameplate. If electronic marking is used, it must be readily accessible without the use of special tools or equipment.

5. APPLICATION DATA REQUIREMENTS. You must give the FAA aircraft certification office (ACO) manager responsible for your facility a statement of conformance, as specified in 14 CFR § 21.603(a)(1) and one copy each of the following technical data to support your design and production approval. LODA applicants must submit the same data (excluding paragraph **5.g**) through their civil aviation authority.

a. A Manual(s) containing the following:

(1) Provide operating instructions and article limitations sufficient to describe the equipment's operational service capability.

(2) Describe in detail any deviations.

(3) Installation procedures and limitations sufficient to ensure that the AeroMACS AMS equipment, when installed according to the installation or operational procedures, still meets this TSO's requirements. Limitations must identify any unique aspects of the installation. The limitations must include a note with the following statement:

> "This article meets the minimum performance and quality control standards required by a technical standard order (TSO). Installation of this article requires separate approval."

(4) For each unique configuration of software and airborne electronic hardware, reference the following:

(a) Software part number including revision and design assurance level;

(b) Airborne electronic hardware part number including revision and design assurance level; and,

(c) Functional description.

(5) A summary of the test conditions used for environmental qualifications for each component of the article. For example, a form as described in RTCA/DO-160G, *Environmental Conditions and Test Procedures for Airborne Equipment*, Appendix A.

(6) Schematic drawings, wiring diagrams, and any other documentation necessary for installation of the AeroMACS AMS equipment.

(7) List of replaceable components, by part number, that makes up the AeroMACS AMS equipment. Include vendor part number cross-references, when applicable.

b. Instructions covering periodic maintenance, calibration, and repair, to ensure that the AeroMACS AMS equipment continues to meet the TSO approved design. Include recommended inspection intervals and service life, as appropriate.

c. If the article includes software: a plan for software aspects of certification (PSAC), software configuration index, and software accomplishment summary.

d. If the article includes simple or complex custom airborne electronic hardware: a plan for hardware aspects of certification (PHAC), hardware verification plan, top-level drawing, and hardware accomplishment summary (or similar document, as applicable).

e. A drawing depicting how the article will be marked with the information required by paragraph **4** of this TSO.

f. Identify functionality or performance contained in the article not evaluated under paragraph **3** of this TSO (that is, non-TSO functions). Non-TSO functions are accepted in parallel with the TSO authorization. For those non-TSO functions to be accepted, you must declare these functions and include the following information with your TSO application:

(1) Description of the non-TSO function(s), such as performance specifications, failure condition classifications, software, hardware, and environmental qualification levels. Include a statement confirming that the non-TSO function(s) do not interfere with the article's compliance with the requirements of paragraph **3**.

(2) Installation procedures and limitations sufficient to ensure that the non-TSO function(s) meets the declared functions and performance specification(s) described in paragraph **5.f.(1)**.

(3) Instructions for continued performance applicable to the non-TSO function(s) described in paragraph **5.f.(1).**

(4) Interface requirements and applicable installation test procedures to ensure compliance with the performance data defined in paragraph **5.f.(1).**

(5) Test plans, analysis and results, as appropriate, to verify that performance of the hosting TSO article is not affected by the non-TSO function(s).

(6) Test plans, analysis and results, as appropriate, to verify the function and performance of the non-TSO function(s) as described in paragraph **5.f.(1).**

g. The quality system description required by 14 CFR § 21.608, including functional test specifications. The quality system should ensure that you will detect any change to the approved design that could adversely affect compliance with the TSO MPS, and reject the article accordingly. (Not required for LODA applicants.)

h. Material and process specifications list.

i. List of all drawings and processes (including revision level) that define the article's design.

j. Manufacturer's TSO qualification report showing results of testing accomplished according to paragraph **3.c** of this TSO.

6. MANUFACTURER DATA REQUIREMENTS. Besides the data given directly to the responsible ACO, have the following technical data available for review by the responsible ACO:

a. Functional qualification specifications for qualifying each production article to ensure compliance with this TSO.

b. Article calibration procedures.

c. Schematic drawings.

d. Wiring diagrams.

e. Material and process specifications.

f. The results of the environmental qualification tests conducted according to paragraph **3.d** of this TSO.

g. If the article includes software, the appropriate documentation defined in RTCA/DO-178B or RTCA/DO-178C as specified in paragraph **3.e** of this TSO, including all

data supporting the applicable objectives in Annex A, *Process Objectives and Outputs by Software Level*.

h. If the article contains non-TSO function(s), you must also make available items **6.a** through **6.g** as they pertain to the non-TSO function(s).

7. FURNISHED DATA REQUIREMENTS.

a. If furnishing one or more articles manufactured under this TSO to one entity (such as an operator or repair station), provide one copy or on-line access to the data in paragraphs **5.a** and **5.b** of this TSO. Add any other data needed for the proper installation, certification, use, or for continued compliance with the TSO, of the AeroMACS AMS equipment.

b. If the article contains declared non-TSO function(s), include one copy of the data in paragraphs **5.f.(1)** through **5.f.(4).**

8. HOW TO GET REFERENCED DOCUMENTS.

a. Order RTCA documents from RTCA Inc., 1150 18th Street NW, Suite 910, Washington, D.C. 20036. Telephone (202) 833-9339, fax (202) 833-9434. You can also order copies online at www.rtca.org .

b. Order copies of 14 CFR parts 21 and 45 from the Superintendent of Documents, Government Printing Office, P.O. Box 979050, St. Louis, MO 63197. Telephone (202) 512-1800, fax (202) 512-2104. You can also order copies online at http://bookstore.gpo.gov/.

c. You can find a current list of technical standard orders and advisory circulars on the FAA Internet website Regulatory and Guidance Library at http://rgl.faa.gov/. You will also find the TSO Index of Articles at the same site.

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